NRC FORM 195 (2-76)

U.S. NUCLEAR REGULATORY COMMISSION

NRC DISTRIBUTION FOR PART 50 DOCKET MATERIAL

DOCKET NUMBER: 50 - 263

FILE NUMBER:

TO: Mr. Victor Stello

FROM: Northern States Power Company, Minneapolis, Minnesota, L. O. Mayer

DATE OF DOCUMENT: 8/29/77

DATE RECEIVED: 8/31/77

☑ LETTER ☑ ORIGINAL ☐ COPY ☑ NOTORIZED ☑ UNCLASSIFIED

PROP:

INPUT FORM:

NUMBER OF COPIES RECEIVED: 3 SIGNED

DESCRIPTION

(2-P)

ENCLOSURE

Consists of response to NRC request for information concerning the Mark I Containment.....notorized 8/29/77.....

(1/4")

PLANT NAME: Monticello
RJL 8/31/77

FOR ACTION/INFORMATION

SAFETY		ENVIRONMENTAL	
ASSIGNED AD:		ASSIGNED AD:	V. MOORE (LTR)
BRANCH CHIEF: (7)	DAVIS	BRANCH CHIEF:	
PROJECT MANAGER:		PROJECT MANAGER:	
LICENSING ASSISTANT:		LICENSING ASSISTANT:	
			B. HARLESS

INTERNAL DISTRIBUTION

☒ REG FILES		SYSTEMS SAFETY		PLANT SYSTEMS	SITE SAFETY &
☑ NRC PDR		HEINEMAN	☑	TEDESCO	ENVIRON ANALYSIS
☑ I & E (2)		SCHROEDER		BENAROYA	DENTON & MULLER
☑ OELD LTR			☑	LAINAS	CRUTCHFIELD
☑ GOSSICK & STAFF LTR		ENGINEERING		IPPOLITO	
HANAUER	☑	KNIGHT	☑	E. ROSA	ENVIRO TECH.
MIPC		BOSNAK			ERNST
☑ CASE LTR	☑	SIHWELL		OPERATING REACTORS	BALLARD
☑ BOYD LTR		PAWLICKI		STELLO	YOUNGBLOOD
☑ DEYOUNG LTR	☑	GUIBERT	☑	EISENHUT	
PROJECT MANAGEMENT		REACTOR SAFETY	☑	SHAO	~~SITE TECH.~~
SKOVHOLT		ROSS		BAER	
P. COLLINS		NOVAK	☑	BUTLER (2)	GAMMILL (2)
HOUSTON		ROSZTOCZY		GRIMES	
MELTZ		CHECK			SITE ANALYSIS
HELTEMES					VOLLMER
SK		AT&I			BUNCH
		SALTZMAN			J. COLLINS
		RUTBERG			KREGER

EXTERNAL DISTRIBUTION

☑ LPDR: MINNEAPOLIS MN.			CONTROL NUMBER
☑ TIC	☑ NSIC		misc 4
NAT LAB			7724302 91
REG IV (J. HANCHETT)			B
☑ 16 CYS ACRS SENT CATEGORY B			

NRC FORM 195 (2-76)

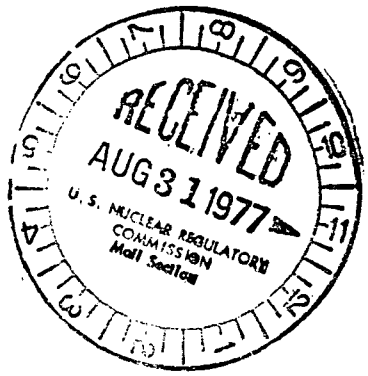
REGULATORY DOCKET FILE COPY

NSP

NORTHERN STATES POWER COMPANY

MINNEAPOLIS, MINNESOTA 55401

August 29, 1977



Mr Victor Stello, Director
Division of Operating Reactors
c/o Distribution Services Branch, DDC, ADM
U S Nuclear Regulatory Commission
Washington, DC 20555

Dear Mr Stello:

MONTICELLO NUCLEAR GENERATING PLANT
Docket No. 263 License No. DPR-22

Removal of Drywell-Wetwell
Differential Pressure Controls

On August 23, 1977 representatives of Northern States Power Company met with members of your staff to review progress of the Mark I Containment modifications at Monticello. We also addressed the NRC criteria for removal of differential pressure controls which were transmitted to us with a letter from Mr D K Davis, dated May 19, 1977. Enclosure (1) contains copies of the view graphs used during our presentation during the August 23 meeting.

During this meeting we were informed by your staff that to remove differential pressure controls we must either demonstrate compliance with the criteria in the May 19 letter or the loads must be less than code allowable. It is shown in Tables 2.2-2 and Tables 2.2-3 of enclosure (2) that at the maximum torus water level the strength ratios of all critical structural elements are either less than 0.5 or code allowable. The loads used to derive these ratios were determined in accordance with the information contained in the May 19 letter.

Since the Staff criteria for removal of differential pressure controls are satisfied at Monticello we hereby withdraw our License Amendment Request dated April 15, 1977 and our License Amendment Request dated November 5, 1976, which was superseded by the April 15 submittal, and the commitments contained in our March 1, 1976 letter to you on this subject. The amendment requests contained revisions to the Technical Specifications covering the drywell to suppression chember differential pressure, containment water volume and differential pressure instrumentation.

For your information, we have provided the strength ratios of the critical structural elements at the maximum torus water level without delta-P and without the 1.33 multiplier. This information is contained in Tables 2.2-1a, 2.2-2a and 2.2-3a of enclosure (2), and demonstrates that all elements meet code allowable or are very close to it. The 1.33 multiplier was dropped for this case on the

7724302 91

basis of the information presented to your staff by General Electric on August 24, 1977, which demonstrated that the pool swell loads from the one quarter scale test program are approximately 80% of the values reported in the Short Term Program Report.

Yours very truly,

L H Taylor for

L O Mayer, PE
Manager of Nuclear Support Services

LOM/LLT/ak

cc: J G Keppler
G Charnoff
MPCA - Attn: J W Ferman

UNITED STATES NUCLEAR REGULATORY COMMISSION

NORTHERN STATES POWER COMPANY

MONTICELLO NUCLEAR GENERATING PLANT

Docket No. 50-263

License No. DPR-22

LETTER DATED AUGUST 29, 1977
RESPONDING TO NRC REQUESTS
FOR INFORMATION ON CONTAINMENT DESIGN

Northern States Power Company, a Minnesota corporation, by this letter dated August 29, 1977 hereby submits information in response to NRC requests for information concerning the Mark I Containment.

This request contains no restricted or other defense information.

NORTHERN STATES POWER COMPANY

By L J Wachter
L J Wachter
Vice President, Power Production
& System Operation

On this 29th day of August, 1977, before me a notary public in and for said County, personally appeared L J Wachter, Vice President, Power Production and System Operation, and being first duly sworn acknowledged that he is authorized to execute this document on behalf of Northern States Power Company, that he knows the contents thereof and that to the best of his knowledge, information and belief, the statements made in it are true and that it is not interposed for delay.

Denise E. Halvorson

DENISE E. HALVORSON
NOTARY PUBLIC - MINNESOTA
HENNEPIN COUNTY
My Commission Expires Oct. 10, 1981

TORUS SUPPORT COLUMN CONNECTION

- PURPOSE OF REINFORCEMENT

  - COMPLETE SUPPORT REINFORCEMENT CHAIN

  - PIN CONNECTION AT BASE OF COLUMN AND COLUMNS HAVE BEEN PREVIOUSLY REINFORCED

- LOAD BASIS FOR STRENGTH RATIO CALCS.

  - PLANT UNIQUE ANALYSIS REPORT (SHORT TERM PROGRAM)

  - POOL SWELL + DEAD LOAD + SEISMIC W/ΔP
    IS COL. = 654.4K
    OS COL. = 847.2K

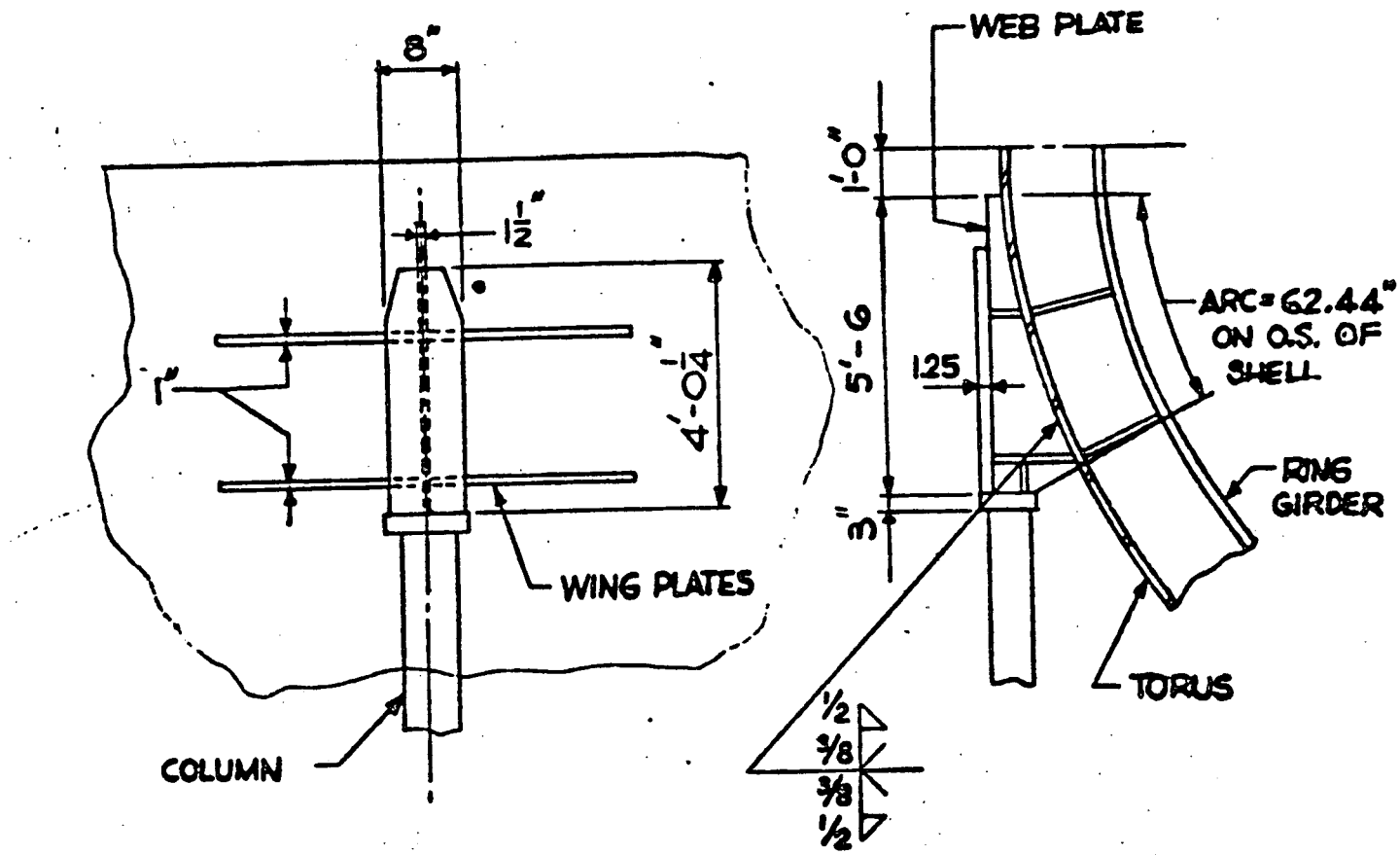


Figure 2.2-1

UNREINFORCED SUPPORT COLUMN TO SHELL CONNECTION

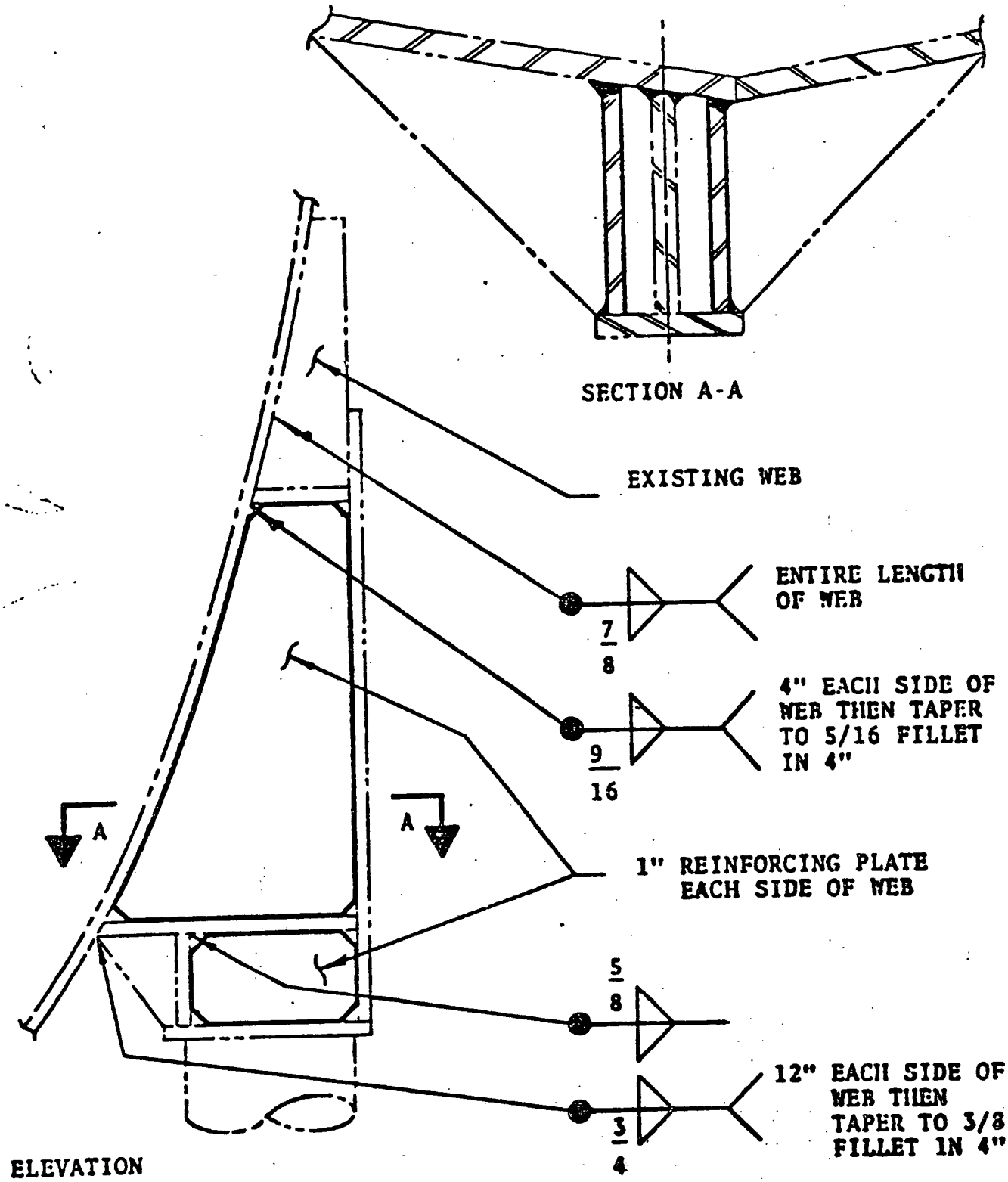


Figure 2.2-2

REINFORCED SUPPORT COLUMN TO SHELL CONNECTION

TORUS SUPPORT CAPACITIES

COMPONENT	CODE ALLOWABLE	ULTIMATE	STRENGTH RATIO
SHELL CONNECTION	940K	2820K	0.30
COLUMN	1189K	3288K	0.26
PIN CONNECTION	993K	2960K	0.29

STP DOWNWARD LOAD W/$\triangle$P FOR O.S. COLUMN = 847K

SUMMARY

- INCREASED SIZE OF EXISTING WELDS TO FULLY DEVELOP STRENGTH OF 1 1/2" WEB PLATE

- ADDED 1" REINFORCING PLATES PARALLEL TO EXISTING WEB

- PERFORMED FINITE ELEMENT ANALYSIS OF REINFORCED CONNECTION

- REPLACED APPROXIMATE MANUAL CALCULATION OF CONNECTION STRENGTH WITH ACCURATE COMPUTER ANALYSIS

- INCREASED CODE ALLOWABLE STRENGTH OF CONNECTION TO BE NEAR THAT OF COLUMN AND PIN CONNECTION AT BASE OF COLUMN

VENT HEADER SUPPORT COLUMN CONNECTION

- PURPOSE
  - INCREASE CONNECTION CAPACITY TO BE NEAR THAT OF COLUMN IN TENSION
  - CONNECTION CAPACITY 74 KIPS
  - PIPE COL. CAPACITY 151 KIPS

- LOAD BASIS
  - PLANT UNIQUE ANALYSIS REPORT (SHORT TERM PROGRAM)
  - POOL SWELL IMPACTING VENT HEADER MAX. NET TENSION = 131 KIPS

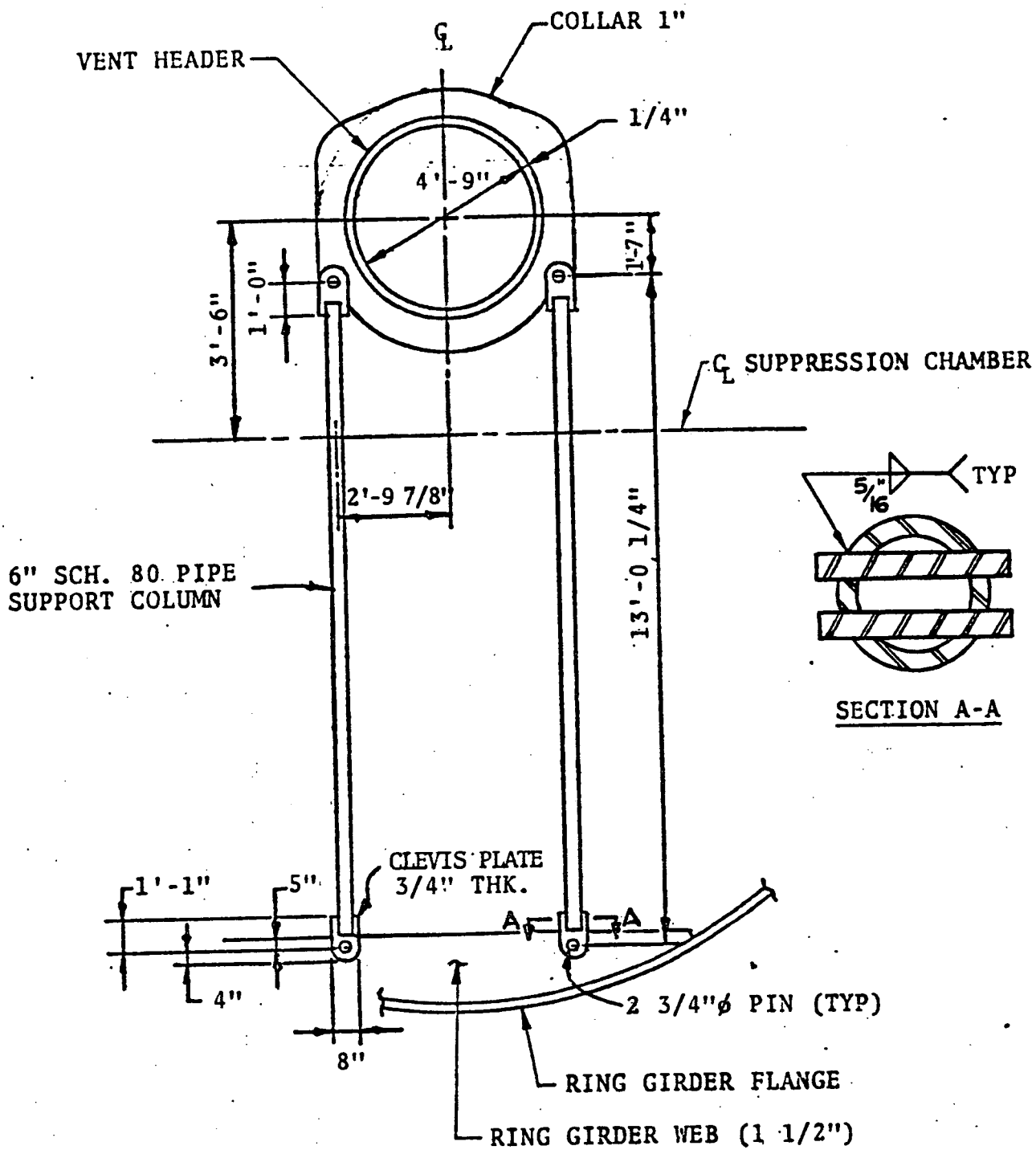


Figure 3.3-1

VENT HEADER SUPPORTS

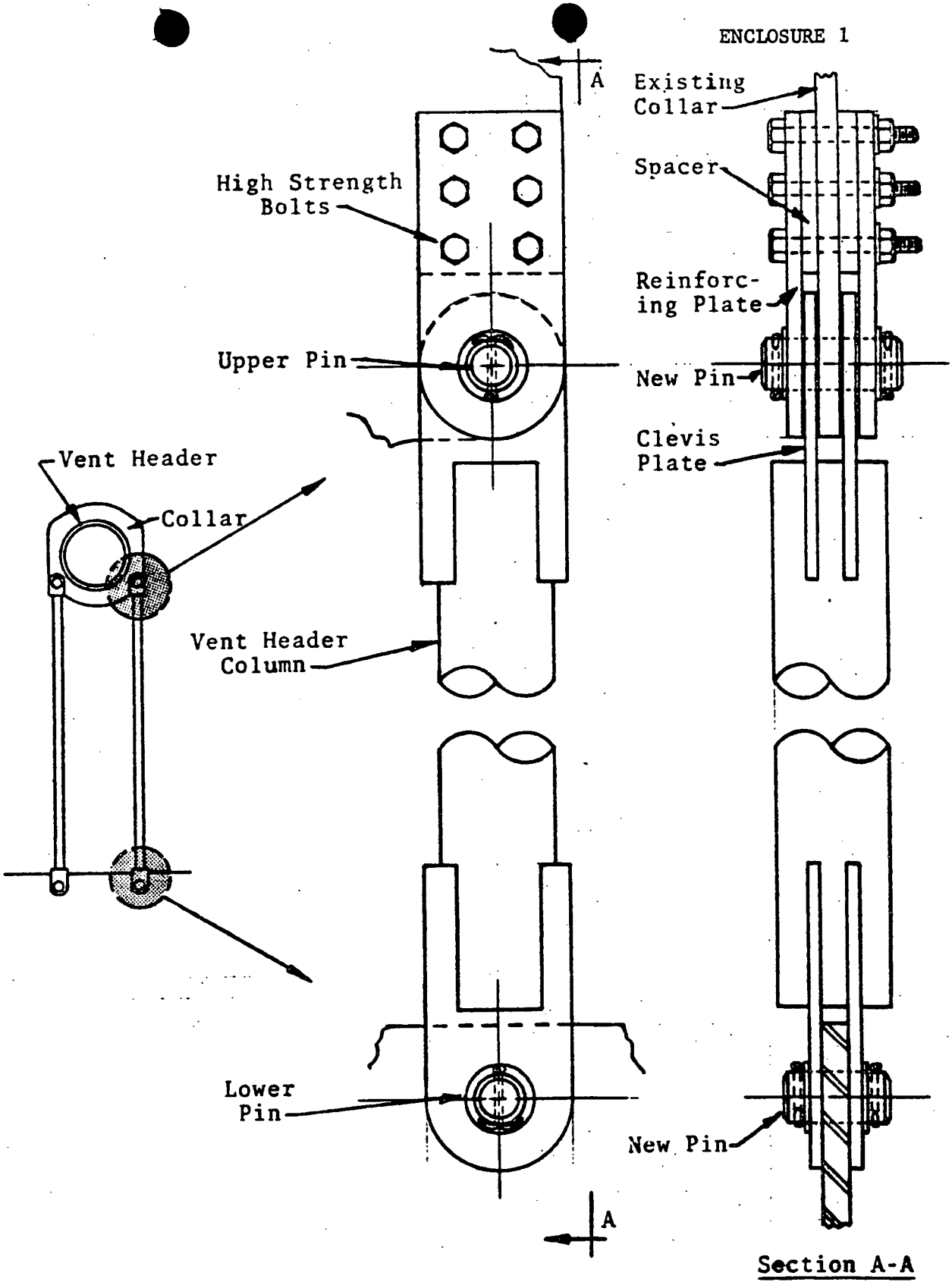


Figure 4.0-1
VENT HEADER COLUMN MODIFICATION

CODE ALLOWABLE CAPACITY

ELEMENT	STRESS	UNREINF.	REINF.
COLLAR	SHEAR	88^K	220^K
UPPER PIN	SHEAR	143^K	911^K
	BEARING	74^K	141^K
	BENDING	140^K	926^K
PIN PLATE	TENSION	134^K	134^K
	SHEAR	132^K	132^K
	WELD SHEAR	223^K	223^K
PIPE COL.	TENSION	151^K	151^K
LOWER PIN	SHEAR	143^K	548^K
	BEARING	111^K	141^K
	BENDING	117^K	449^K
RING WEB	SHEAR	138^K	138^K

SYSTEM

UNREINFORCED CAPACITY = 74^K

REINFORCED CAPACITY = 132^K

ULTIMATE CAPACITY

ELEMENT	STRESS	UNREINF.	REINF.
COLLAR	SHEAR	276^K	690^K
UPPER PIN	SHEAR	606^K	1885^K
	BEARING	308^K	462^K
	BENDING	373^K	2469^K
PIN PLATE	TENSION	548^K	548^K
	SHEAR	413^K	413^K
	WELD SHEAR	589^K	589^K
PIPE COL.	TENSION	462^K	462^K
LOWER PIN	SHEAR	606^K	1134^K
	BEARING	462^K	462^K
	BENDING	313^K	1197^K
RING WEB	SHEAR	431^K	431^K

SYSTEM

UNREINFORCED CAPACITY = 276^K

REINFORCED CAPACITY = 413^K

VENT HEADER SUPPORT CAPACITIES

	CODE ALLOWABLE	ULTIMATE	STRENGTH RATIO
PRIOR TO REINFORCEMENT	74K	276K	0.47
AFTER REINFORCEMENT	132K	413K	0.32

STP LOAD = 131 KIPS

DRYWELL/WETWELL DIFFERENTIAL PRESSURE REMOVAL

- NRC CRITERIA

  - DETERMINE LOADS W/O ΔP USING STP REPORT ADDENDUM 2

  - INCREASE LOADS W/O ΔP BY 33%

  - LIMITING STRENGTH RATIO = 0.50

TABLE 2.1-1

TORUS SUPPORT COLUMN MAXIMUM COMPRESSIVE LOADS

AT MINIMUM WATER LEVEL

1	2	3	4	5	6	7
COLUMN	POOLSWELL LOAD (ΔP) (KIPS) (1)	ADJUSTED POOLSWELL LOAD (KIPS) (2)	STEEL & WATER LOAD (KIPS) (1)	VERTICAL SEISMIC LOAD (KIPS) (1)	HORIZONTAL SEISMIC LOAD (KIPS) (1)	TOTAL LOAD (KIPS) (3)
INSIDE	493.3	795.3	147.6	8.8	4.7	956.4
OUTSIDE	655.9	1057.4	172.6	10.4	8.3	1248.7

NOTES:

(1) NSP-01-140, Table 6.1.1-1, minimum submergence, Reference 2

(2) "Acceptance Criteria for the Removal or Reduction of Drywell-Wetwell Differential Pressure Controls"

$493.3 \times (\frac{1}{.825}) \times (1.33) = 795.3$

$655.9 \times (\frac{1}{.825}) \times (1.33) = 1057.4$

(3) Summation of columns 3, 4, 5, and 6

TABLE 2.1-2

DOWNWARD LOADS

ULTIMATE CAPACITIES AND STRENGTH RATIOS

AT MINIMUM WATER LEVEL

1		2	3	4
COMPONENT		LOAD (KIPS) (1)	STP ULTIMATE CAPACITY (KIPS)	ULTIMATE STRENGTH RATIO
INSIDE	SHELL CONNECTION	956.4	2820 (2)	.34
	COLUMN		3140 (3)	.30
	PIN CONNECTION		2960 (3)	.32
OUTSIDE	SHELL CONNECTION	1248.7	2820 (2)	.44
	COLUMN		3288 (3)	.38
	PIN CONNECTION		2960 (3)	.42

NOTES:

(1) Adjusted no ΔP load for minimum submergence from Table 2.1-1

(2) Capacities per NSP-01-176, Reference 4

(3) Capacities per NSP-01-140, Reference 2

TABLE 2.1-3

STRESS INTENSITIES AND STRENGTH RATIOS

FOR RING AND SHELL AT MINIMUM WATER LEVEL

1	2	3	4	5	6	7	8	9
COMPONENT	MAXIMUM STRESS INTENSITY (KSI) (1)		ADJUSTED MAXIMUM STRESS INTENSITY (KSI) (2)		STP ULTIMATE CAPACITY (KSI)		ULTIMATE STRENGTH RATIO	
	P_L	$P_L + Q$	P_L	$P_L + Q$	P_L	$P_L + Q$	P_L	$P_L + Q$
RING	16.6	16.6	23.9	23.9	76.0	76.0	.31	.31
SHELL	21.6	24.0	32.2	36.2	76.0	76.0	.42	.48

NOTES:

(1) Stress from NSP-01-140 for minimum submergence with Δp (1.0 psi), Reference 2.

(2) Pool Swell loads without Δp increased by 1/3 and added to dead load plus seismic

(3) P_L = Local primary membrane stresses

(4) Q = Secondary stresses

Table 2.2-1

TORUS SUPPORT COLUMN MAXIMUM COMPRESSIVE LOADS

AT MAXIMUM WATER LEVEL

1	2	3	4	5	6	7
COLUMN	POOLSWELL LOAD (ΔP) (KIPS) (1)	ADJUSTED POOLSWELL LOAD (KIPS) (2)	STEEL & WATER LOAD (KIPS) (3)	VERTICAL SEISMIC LOAD (KIPS) (3)	HORIZONTAL SEISMIC LOAD (KIPS) (3)	TOTAL LOAD (KIPS) (4)
INSIDE	530.9	855.9	164.0	9.8	5.2	1034.9
OUTSIDE	705.9	1138.0	191.8	11.6	9.2	1350.6

NOTES:

(1) NSP-01-168, Table 2, Maximum submergence, Reference 5

(2) "Acceptance Criteria for the Removal or Reduction of Drywell-Wetwell Differential Pressure Controls"

$$530.9 \times \left(\frac{1}{.825}\right) \times (1.33) = 855,9$$

$$705.9 \times \left(\frac{1}{.825}\right) \times (1.33) = 1138.0$$

(3) Table 2, NSP-01-168

(4) Summation of Columns 3, 4, 5, and 6

TABLE 2.2-2

DOWNWARD LOADS

ULTIMATE CAPACITIES AND STRENGTH RATIOS

AT MAXIMUM WATER LEVEL

1		2	3	4
	COMPONENT	LOAD (KIPS) (1)	STP ULTIMATE CAPACITY (KIPS)	ULTIMATE STRENGTH RATIO
INSIDE	SHELL CONNECTION	1034.9	2820 (2)	.37
	COLUMN		3140 (3)	.33
	PIN CONNECTION		2960 (3)	.35
OUTSIDE	SHELL CONNECTION	1350.6	2820 (2)	.48
	COLUMN		3288 (3)	.41
	PIN CONNECTION		2960 (3)	.46

NOTES:

(1) Adjusted no ΔP load for maximum submergence from Table 2.2-1

(2) Capacities per NSP-01-176, Reference 4

(3) Capacities per NSP-01-140, Reference 2

STRUCTURAL CAPACITY SUMMARY

- TORUS SUPPORT COLUMN CONNECTIONS HAVE BEEN REINFORCED

- VENT HEADER SUPPORT COLUMN CONNECTION REINFORCEMENT IS PLANNED

- NRC CRITERIA FOR ΔP REMOVAL DURING SRV DISCHARGE TEST IS SATISFIED

TABLE 2.2-3

STRESS INTENSITIES AND STRENGTH RATIOS

FOR RING AND SHELL AT MAXIMUM WATER LEVEL

1	2	3	4	5	6	7	8	9
COMPONENT	MAXIMUM STRESS INTENSITY (KSI) (1)		ADJUSTED MAXIMUM STRESS INTENSITY (KSI) (2)		STP ULTIMATE CAPACITY (KSI)		ULTIMATE STRENGTH RATIO	
	P_L	$P_L + Q$	P_L	$P_L + Q$	P_L	$P_L + Q$	P_L	$P_L + Q$
RING	16.6	16.6	25.4	25.4	76.0	76.0	.33	.33
SHELL	21.6	24.0	34.4	38.7	76.0	76.0	.45	MEETS CODE

NOTES:

(1) Stress from NSP-01-140 for minimum submergence with Δp (1.0 psi), Reference 2.

(2) Pool swell loads with Δp increased by 1/3 and added to dead load plus seismic

(3) P_L = Local primary membrane stresses

(4) Q = Secondary stresses

TABLE 2.2-3A

STRESS INTENSITIES AND STRENGTH RATIOS

FOR RING AND SHELL AT MAXIMUM WATER LEVEL

1	2	3	4	5	6	7	8	9
COMPONENT	MAXIMUM STRESS INTENSITY WITHOUT ΔP (ksi) (1)		CODE ALLOWABLE STRESS INTENSITY (ksi) (2)		STP ULTIMATE CAPACITY (ksi)		STRENGTH RATIO ULTIMATE\CODE	
	P_L	P_L+Q	P_L	P_L+Q	P_L	P_L+Q	P_L	P_L+Q
RING	20.5	20.5	19.3	57.8	76.0	76.0	1.06 / .27	.35 / MEETS CODE
SHELL	26.9	30.1	28.95	57.8	76.0	76.0	.93 / MEETS CODE	.52 / MEETS CODE

NOTES:

(1) Pool swell loads without Δp added to dead load plus seismic

(2) NSP-01-140

(3) P_L = Local primary membrane stresses

(4) Q = Secondary stresses

TABLE 2.2-2

DOWNWARD LOADS

ULTIMATE CAPACITIES AND STRENGTH RATIOS

AT MAXIMUM WATER LEVEL

1		2	3	4	5	6
COMPONENT		LOAD (KIPS) (1)	CODE ALLOWABLE LOAD (KIPS)	ULTIMATE CAPACITY (KIPS)	CODE ALLOWABLE RATIO	ULTIMATE CAPACITY RATIO
INSIDE	SHELL CONNECTION	1034.9	940 (2)	2820 (2)	1.10	.37
	COLUMN		1117 (3)	3121 (3)	.93	MEETS CODE
	PIN CONNECTION		993 (3)	2960 (3)	1.04	.35
OUTSIDE	SHELL CONNECTION	1350.6	940 (2)	2820 (2)	1.44	.48
	COLUMN		1166 (3)	3172 (3)	1.16	.43
	PIN CONNECTION		993 (3)	2960 (3)	1.36	.46

NOTES:

(1) Adjusted no ΔP load for maximum submergence from Table 2.2-1

(2) Capacities per NSP-01-176, Reference 4

(3) Capacities per NPS-01-140, Reference 2

TABLE 2.2-3

STRESS INTENSITIES AND STRENGTH RATIOS

FOR RING AND SHELL AT MAXIMUM WATER LEVEL

1	2	3	4	5	6	7	8	9
COMPONENT	ADJUSTED MAXIMUM STRESS INTENSITY (ksi) (1)		CODE ALLOWABLE STRESS INTENSITY (ksi) (2)		STP ULTIMATE CAPACITY (ksi)		STRENGTH RATIO ULTIMATE\CODE	
	P_L	$P_L + Q$	P_L	$P_L + Q$	P_L	$P_L + Q$	P_L	$P_L + Q$
RING	25.4	25.4	19.3	57.8	76.0	76.0	1.32 / .33	.44 / MEETS CODE
SHELL	34.4	38.7	28.95	57.8	76.0	76.0	1.19 / .45	.67 / MEETS CODE

NOTES:

(1) Pool swell loads without ΔP increased by 1/3 and added to dead load plus seismic

(2) NSP-01-140

(3) P_L = Local primary membrane stresses

(4) Q = Secondary stresses

TABLE 2.2-1A

TORUS SUPPORT COLUMN MAXIMUM COMPRESSIVE LOADS

AT MAXIMUM WATER LEVEL

1	2	3	4	5	6	7
COLUMN	POOLSWELL LOAD ΔP (kips) (1)	POOLSWELL LOAD WITHOUT ΔP (kips) (2)	STEEL & WATER LOAD (kips) (3)	VERTICAL SEISMIC LOAD (kips) (3)	HORIZONTAL SEISMIC LOAD (kips) (3)	TOTAL LOAD (kips) (4)
INSIDE	530.9	643.5	164.0	9.8	5.2	822.5
OUTSIDE	705.9	855.6	191.8	11.6	9.2	1068.2

NOTES:

(1) NSP-01-168, Table 2, Maximum submergence, Reference 5

(2) Determination of Poolswell Load without Drywell-Wetwell differential pressure

$$530.9 \times \left(\frac{1}{.825}\right) = 643.5$$

$$705.9 \times \left(\frac{1}{.825}\right) = 855.6$$

(3) Table 2, NSP-01-168

(4) Summation of Columns 3, 4, 5, and 6

TABLE 2.2-2A

DOWNWARD LOADS

ULTIMATE CAPACITIES AND STRENGTH RATIOS

AT MAXIMUM WATER LEVEL

1		2	3	4	5	6
COMPONENT		LOAD (KIPS) (1)	CODE ALLOWABLE LOAD (KIPS)	ULTIMATE CAPACITY (KIPS)	CODE ALLOWABLE RATIO	ULTIMATE CAPACITY RATIO
INSIDE	SHELL CONNECTION	822.5	940 (2)	2820 (2)	.88	MEETS CODE
	COLUMN		1120 (3)	3131 (3)	.73	MEETS CODE
	PIN CONNECTION		993 (3)	2960 (3)	.83	MEETS CODE
OUTSIDE	SHELL CONNECTION	1068.2	940 (2)	2820 (2)	1.14	.38
	COLUMN		1178 (3)	3236 (3)	.91	MEETS CODE
	PIN CONNECTION		993 (3)	2960 (3)	1.08	.36

NOTES:

(1) Poolswell Load without ΔP for maximum submergence from Table 2.2-1A

(2) Capacities per NSP-01-176, Reference 4

(3) Capacities per NSP-01-140, Reference 2